

QUARTERLY SUMMARY
OF THE
IMPROVEMENTS AND DISCOVERIES
IN THE
MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

1. *Reunion of Divided Nerves and Recovery of Function.*—The question whether, after an injury of a nerve, its two extremities may unite again by first intention, with simultaneous rapid recovery of function, has recently attracted the attention of Continental physiologists and physicians in a marked manner. Not only have hecatombs of dogs and rabbits been sacrificed on the altar of science for the purpose of settling the question, but there have been several surgical cases of unusual interest under observation which have thrown considerable light upon the point at issue. One of these cases recently occurred at Paris, under the care of M. Nélaton, and was reported in the *Société de Chirurgie* by M. Honel. A patient was operated upon by Nélaton for a neuroma in the course of the median nerve, and a piece of the nerve, about an inch long, had to be excised. Both extremities of the nerve were then united by metallic sutures. As early as the following day, Nélaton observed some movements of the thumb and return of sensation in those parts of the skin animated by the median nerve. On the second day after operation these phenomena were quite distinct, and a week afterwards both motion and sensation were so far re-established that there could be no longer any doubt about the nerve having been quite restored to its natural condition. Most of the members of the *Société de Chirurgie* declared this to be impossible. Messrs. Broca and Verneuil asserted that either the observation of the case had been faulty, or the diagnosis must have been wrong from the first. There was no case on record at all similar to the one just mentioned, and physiology, as well as observations at the bedside, plainly proved that regeneration of nerves was exceedingly slow, and protracted over months and even years.

A few days after this discussion had taken place, M. Laugier related an analogous case which had just occurred in his wards in the *Hôtel Dieu*, at a meeting of the Academy of Sciences. The case was one of injury to the forearm, both the radial and ulnar arteries, the *palmaris longus et brevis* muscles, some bundles of the flexor sublimis and the median nerve being torn asunder in a transverse direction. When the patient was brought into the Hospital, hemorrhage was so considerable that the house-surgeon at once tied both arteries, and united the flaps of the skin by sutures. When M. Laugier saw the patient sensation was entirely gone in the whole extent of surface animated by the median nerve, viz., the palmar surface of the thumb, first and second fingers, and the radial side of the third finger; and partly gone in the skin animated by the radial nerve, viz., the index and the inferior part of the dorsal surface of the second finger; only two-thirds of the transverse diameter of the radial nerve having been torn asunder, opposition of the thumb was impossible. M. Laugier thereupon reopened the wound, and found the lower end of the

median nerve free just above the annular ligament; the upper end was not visible, and for the purpose of finding it, he incised the flap to the length of about three inches, and after section of the flexor sublimis muscle, the upper end of the median nerve came to light. Laugier now united both ends of the nerve by a silk suture. The pain and fever after this operation were not more severe than they might have been after the original injury. On the evening of the same day sensibility appeared to a certain extent restored, but it was still very obtuse. The next day, however, it was much more distinct, although there was still some difference in the parts animated by the median and ulnar nerves respectively. Opposition of the thumb was easy. On the second and third days the patient was not yet able to feel pain or to distinguish heat from cold. On the fourth day the sensation of temperature had returned. M. Laugier was of opinion that the rapidity of recovery of nervous function in this case, when compared with the experiments made on animals, was partly due to a different operative proceeding, and partly to the perfect immobility of his patient; and he drew the following conclusions from the case:—

1. If after the section of a nerve, its two ends are united by suture, sensation and motion of the parts animated by the nerve may to a great extent be restored within a few hours.

2. The recovery of function is altogether rapid.

3. It is successive—that is, tactile sensation and motion return before the sensation of pain and temperature.

4. The nerve-suture causes neither particular pain nor other symptoms of a severe nature.

5. It therefore appears necessary to receive the suture of large nerves as a legitimate surgical operation.

This first report was followed by a second, made thirty-six days after the operation, and which is to the following effect: On the twelfth day the ligature came away, and symptoms of severe neuritis set in, viz., lancinating pains in the thumb, first, and second finger. At the same time, there was numbness in these fingers, and considerable decrease of the sensibility previously regained. The symptoms of neuritis disappeared after five or six days, and there was then gradual recovery of sensibility, although at the time of the report this was still in a somewhat unsatisfactory condition. The Academy has charged a committee, consisting of MM. Flourens, Andral, Velpeau, and Bernard, with the examination of the patient in question; and this is so much the more to be commended as the account M. Laugier has given is in several respects very loose, and his examination does not seem to have been made with that degree of caution which ought to be employed under such circumstances.

The most recent physiological experiments on this subject have been undertaken by Drs. Eulenburg and Landois, of Greifswald, who operated on all kinds of nerves—viz., motor, sentient, vaso-motor, and inhibitory—in dogs and rabbits. The general results at which these gentlemen have arrived are as follows: If nerves are divided and afterwards united by suture, there is no tendency to healing by first intention, even if the coaptation of the ends has been most careful and aided by immobility of the limb, &c. On the contrary, there are invariably signs of interrupted conduction at the locality of the suture and lost function of the peripheral end of the nerve; that is, we observe loss of motion and of electric contractility of the muscles if motor nerves have been divided and re-united. In the case of sentient nerves there is loss of sensation; in that of vaso-motor nerves there is increase of temperature, profound disturbance of nutrition, and even gangrene; and in inhibitory nerves, loss of inhibitory influence. All these symptoms remain unchanged within the next days and weeks. The microscopical examination shows the same results, there being within the first few days after the operation fatty degeneration of the peripheral end of the nerve, just as after section without subsequent union. On the other hand, the fibres of the central end remain comparatively unchanged. The cylinder axis takes part in the degeneration. It is true that, on adding collodium, it becomes visible at the peripheral end, but its width is very unequal, and occasionally it is quite interrupted; while such changes have never been observed in the central end. The operation of nerve-suture causes, in many cases, a more or less ex-

tensive neuritis and peri-neuritis, which may even give rise to suppuration and metastatic abscesses in the lungs, and it is, therefore, by no means devoid of danger. It thus appears that M. Laugier's proposal of adopting nerve-suture as a legitimate operation ought to be rejected—an opinion in which most surgeons will probably coincide.—*Med. Times and Gaz.*, Jan. 21, 1865.

2. *Urochrome; the Colouring matter of Urine.*—Dr. J. L. W. THUDICHUM, in an essay which obtained the Hastings Medal of the British Medical Association, gives an account of his interesting researches relative to the colouring matter of the urine. He presents the following summary of his results:—

1. The colouring matter of the urine, to which the name of urochrome is given, is one of the most interesting compounds in the list of organic and physiological substances.

2. It can be isolated in a pure state; and then is yellow, easily soluble in water, less so in ether, and least in alcohol.

3. When its quantity [in equal bulks of solution] is increased, its colour still remains purely yellow. Consequently the hypothesis of Vogel, that the urine of healthy and sick persons becomes darker in proportion to the increase of colouring matter, is fallacious.

4. Under various processes of decomposition, urochrome yields a red resin, consisting mainly of uropittine [having the elementary composition $C^{18}H^{10}N^2O^6$, and of omicholic acid, mixed with small quantities of undetermined matters], black matter, uromelaune [having the elementary composition $C^{12}H^7NO^4$], and other products.

5. By a simple process, probably of oxidation, urochrome passes into a red colouring matter, urerythrine, which [sometimes] colours red the urine of disease, and any deposits of urates contained in it. Frequently, this oxidation is only effected after emission. The red colour may also be due to omicholic acid, which is a little soluble in ammoniacal salts.

6. The fetor of decomposed acid or alkaline urine is due to the uropittine and omicholic acid, and substances derived from them. It may be increased by, but is not primarily due to, carbonate of ammonia.

7. The urine of man contains an essential oil, which is volatile; has a strong peculiar odour; a curious reaction with iron chloride; and yields a diagnostic pink reaction with nitrate of mercury on boiling.¹

8. Human urine also contains cresylic alcohol, which is obtained, along with urochrome, by one of the processes for its isolation.

9. One of the principal features of uræmia is the retention in the blood of urochrome. It is there decomposed, and yields uropittine and omicholic acid, which, circulating in the blood, vitiate all tissues, can be found in the crusts on the teeth, and their smell can be perceived in the breath and the perspiration.

10. When colouring matter is retained, the typhoid symptoms of uræmia are prominent. The treatment with acids, under those circumstances, has to be set aside, as promoting the retention of the poisonous uropittine and omicholic acid, and a treatment with alkalies has to be substituted. The skin must be purified by washing, and repeated perspiration induced, until the effluvia do not any longer smell of uropittine.

[11. From healthy human urine, neither indican, nor uroxanthine, nor any other substance yielding by decomposition with acids indigo-red and indigo-blue, can be extracted; neither does it yield indigo-red or indigo-blue by boiling with acids.]

12. Urochrome has no immediately apparent relation to the colouring matters of the blood or the bile. It is a derivate of albuminous matter, and the most essentially characterizing ingredient of urine.—*British Med. Jour.*, Nov. 5, 1864.

¹ This reaction is always obtained at the end of Liebig's quantitative analysis for urea, and has excited the curiosity of almost every inquirer who used that method. I have successfully used the appearance of the first trace of pink after the disappearance of all greenish-yellow colour, as the sign that all urea was precipitated and excess of mercury solution present. The soda-test always confirmed the conclusion derived from the pink colour.